already enriched the resources of the analyst, but usually many years elapsed between the original conception of a physical method and its introduction into the analytical laboratory. How rapidly nowadays physical methods find application by the analyst is shown by a glimpse at the contents of this volume, which contains all methods dealing with the interaction of radiation with matter.

Three chapters deal with x-rays: "Absorption Phenomena of X-rays and γ-rays," by G. L. Clark; "X-ray Diffraction Methods as Applied to Powders and Metals," by W. L. Davidson; and "X-ray Diffraction as Applied to Fibres," by J. A. Howsmon. These are followed by an article by L. O. Brockway on electron diffraction. "Spectrophotometry and Colorimetry" are presented by W. R. Brode. Three sections are concerned with spectroscopic topics: "Emission Spectrography," J. Sherman; "Infrared Spectroscopy," H. H. Nielsen and R. A. Oetjen; and "Raman Spectra," J. H. Hibben. Polarimetric methods are discussed by C. D. West and "Refractive Index Measurements" by L. W. Tilton and J. K. Taylor. The treatment of "Electron Microscopy" by R. D. Heidenreich emphasizes application to metals. The last article in the volume, written by H. W. Washburn, deals with mass spectroscopy.

All these are excellent monographs about physical methods which are already acknowledged as indispensable means in quantitative analytical work, or will undoubtedly become of steadily increasing importance. Each paper covers the fundamental principles of each field, detailed treatments of methods, clear descriptions of instruments, critical discussions of the various fields of application, and includes a list of references to specialized texts and original research papers. Since all contributors are experts in their special fields, one finds many valuable discussions of a practical nature that could originate only from continuous laboratory experience. There is no doubt that every analyst will greatly appreciate these valuable contributions and will profit from them.

Credit is due to the publishers for the excellent production of this volume.

K. W. MEISSNER

Department of Physics
Purdue University

The Autobiography of Robert A. Millikan. New York: Prentice-Hall, 1950. 311 pp. $4.50.

Every physicist who has come into contact with Professor Millikan—and who is there of us who has not?—to say nothing of all the countless others in so many fields of practical affairs, will want to read this book in order to discover, if he can, what it is that makes this extraordinary man go. And I believe that he will succeed in finding the answer to a much greater extent than he has a right to expect. It is seldom that a man is so successful in getting his personality into his own writing about himself; here the man we have known speaks to us from every page. Here will be found, for example, an answer to the question which so puzzled or even dismayed the physicists of a generation ago: how was it possible that a man comparatively unheard-of and with no recognized achievement in research should suddenly blossom out at the age of 45 into a physicist of the first magnitude? Although the book does not supply the complete answer, it shows that it was at least no accident. The exuberant energy, and the vision that knew how to concentrate on the essential and the significant, were there all the time, waiting only the inevitable eventual removal of the inhibiting effect of irrelevant and unusual circumstances in his early career.

The book is much more than a record of the life of one man, however; it is a history of the physics of his time, and as such will find its place among the other histories of the most memorable decades that physics has yet experienced.

Not the least interesting part of the book to one who passed through some of the same experiences is the detailed account of Millikan's activities during the first world war. Surely none of the tales of the fabulous activities of physicists during the second war can surpass this tale of its forerunner. But the younger generation should read these war experiences for another reason—as an antidote to the cynicism which became so fashionable in the years immediately after the war. Most of the unselfish men who threw their lives into that war, as did Professor Millikan, were actuated by a sense of high idealism, as were also a large part of the other decent people in this country. This has too easily been forgotten.

P. W. BRIDGMAN

Department of Physics
Harvard University

Heterocyclic Compounds: Three-, Four-, Five-, and Six-Membered Monocyclic Compounds Containing One O, N, and S Atom, Vol. 1. Robert C. Elderfield, Ed. New York: Wiley; London: Chapman & Hall, 1950. 703 pp. $11.00.

The Chemistry of Heterocyclic Compounds: The Heterocyclic Derivatives of Phosphorus, Arsenic, Antimony, Bismuth, and Silicon. Frederick George Mann. New York-London: Interscience, 1950. 180 pp. $5.25.

This introductory volume on heterocyclic chemistry proclaims that the series is to be "a general treatment with primary emphasis on the principles involved." This treatise is long overdue, and if the subsequent volumes live up to the high promise of the first volume a long-felt need will be fulfilled. There have been numerous books on heterocyclic chemistry, but the subject is too complex and diverse for one author or one volume. The compendia which tabulate in great detail all available literature on a subject lack critical evaluation of the chemical principles disclosed. The present effort gives promise of fulfilling the need for a chemistry of heterocyclic compounds.

The first volume covers ethylene oxides, trimethylene oxides, ethylenimines, azetes, furans, thiophenes, pyrroles and derivatives, pyrans, pyrones, thiapyrans, thiapyrones, pyridines, partially hydrogenated pyridines, and piperi-